

Figure 1. The effect of the concentration of the H_2O_2 solution on the amount of the H_2O_2 consumed in the reaction of the H_2O_2 solution with the H_2O_2 solution. The concentration of the H_2O_2 solution was 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 11.0, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 12.0, 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9, 13.0, 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9, 14.0, 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 15.0, 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 16.0, 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9, 17.0, 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9, 18.0, 18.1, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7, 18.8, 18.9, 19.0, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6, 19.7, 19.8, 19.9, 20.0, 20.1, 20.2, 20.3, 20.4, 20.5, 20.6, 20.7, 20.8, 20.9, 21.0, 21.1, 21.2, 21.3, 21.4, 21.5, 21.6, 21.7, 21.8, 21.9, 22.0, 22.1, 22.2, 22.3, 22.4, 22.5, 22.6, 22.7, 22.8, 22.9, 23.0, 23.1, 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 24.0, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 25.0, 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7, 25.8, 25.9, 26.0, 26.1, 26.2, 26.3, 26.4, 26.5, 26.6, 26.7, 26.8, 26.9, 27.0, 27.1, 27.2, 27.3, 27.4, 27.5, 27.6, 27.7, 27.8, 27.9, 28.0, 28.1, 28.2, 28.3, 28.4, 28.5, 28.6, 28.7, 28.8, 28.9, 29.0, 29.1, 29.2, 29.3, 29.4, 29.5, 29.6, 29.7, 29.8, 29.9, 30.0, 30.1, 30.2, 30.3, 30.4, 30.5, 30.6, 30.7, 30.8, 30.9, 31.0, 31.1, 31.2, 31.3, 31.4, 31.5, 31.6, 31.7, 31.8, 31.9, 32.0, 32.1, 32.2, 32.3, 32.4, 32.5, 32.6, 32.7, 32.8, 32.9, 33.0, 33.1, 33.2, 33.3, 33.4, 33.5, 33.6, 33.7, 33.8, 33.9, 34.0, 34.1, 34.2, 34.3, 34.4, 34.5, 34.6, 34.7, 34.8, 34.9, 35.0, 35.1, 35.2, 35.3, 35.4, 35.5, 35.6, 35.7, 35.8, 35.9, 36.0, 36.1, 36.2, 36.3, 36.4, 36.5, 36.6, 36.7, 36.8, 36.9, 37.0, 37.1, 37.2, 37.3, 37.4, 37.5, 37.6, 37.7, 37.8, 37.9, 38.0, 38.1, 38.2, 38.3, 38.4, 38.5, 38.6, 38.7, 38.8, 38.9, 39.0, 39.1, 39.2, 39.3, 39.4, 39.5, 39.6, 39.7, 39.8, 39.9, 40.0, 40.1, 40.2, 40.3, 40.4, 40.5, 40.6, 40.7, 40.8, 40.9, 41.0, 41.1, 41.2, 41.3, 41.4, 41.5, 41.6, 41.7, 41.8, 41.9, 42.0, 42.1, 42.2, 42.3, 42.4, 42.5, 42.6, 42.7, 42.8, 42.9, 43.0, 43.1, 43.2, 43.3, 43.4, 43.5, 43.6, 43.7, 43.8, 43.9, 44.0, 44.1, 44.2, 44.3, 44.4, 44.5, 44.6, 44.7, 44.8, 44.9, 45.0, 45.1, 45.2, 45.3, 45.4, 45.5, 45.6, 45.7, 45.8, 45.9, 46.0, 46.1, 46.2, 46.3, 46.4, 46.5, 46.6, 46.7, 46.8, 46.9, 47.0, 47.1, 47.2, 47.3, 47.4, 47.5, 47.6, 47.7, 47.8, 47.9, 48.0, 48.1, 48.2, 48.3, 48.4, 48.5, 48.6, 48.7, 48.8, 48.9, 49.0, 49.1, 49.2, 49.3, 49.4, 49.5, 49.6, 49.7, 49.8, 49.9, 50.0, 50.1, 50.2, 50.3, 50.4, 50.5, 50.6, 50.7, 50.8, 50.9, 51.0, 51.1, 51.2, 51.3, 51.4, 51.5, 51.6, 51.7, 51.8, 51.9, 52.0, 52.1, 52.2, 52.3, 52.4, 52.5, 52.6, 52.7, 52.8, 52.9, 53.0, 53.1, 53.2, 53.3, 53.4, 53.5, 53.6, 53.7, 53.8, 53.9, 54.0, 54.1, 54.2, 54.3, 54.4, 54.5, 54.6, 54.7, 54.8, 54.9, 55.0, 55.1, 55.2, 55.3, 55.4, 55.5, 55.6, 55.7, 55.8, 55.9, 56.0, 56.1, 56.2, 56.3, 56.4, 56.5, 56.6, 56.7, 56.8, 56.9, 57.0, 57.1, 57.2, 57.3, 57.4, 57.5, 57.6, 57.7, 57.8, 57.9, 58.0, 58.1, 58.2, 58.3, 58.4, 58.5, 58.6, 58.7, 58.8, 58.9, 59.0, 59.1, 59.2, 59.3, 59.4, 59.5, 59.6, 59.7, 59.8, 59.9, 60.0, 60.1, 60.2, 60.3, 60.4, 60.5, 60.6, 60.7, 60.8, 60.9, 61.0, 61.1, 61.2, 61.3, 61.4, 61.5, 61.6, 61.7, 61.8, 61.9, 62.0, 62.1, 62.2, 62.3, 62.4, 62.5, 62.6, 62.7, 62.8, 62.9, 63.0, 63.1, 63.2, 63.3, 63.4, 63.5, 63.6, 63.7, 63.8, 63.9, 64.0, 64.1, 64.2, 64.3, 64.4, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.1, 65.2, 65.3, 65.4, 65.5, 65.6, 65.7, 65.8, 65.9, 66.0, 66.1, 66.2, 66.3, 66.4, 66.5, 66.6, 66.7, 66.8, 66.9, 67.0, 67.1, 67.2, 67.3, 67.4, 67.5, 67.6, 67.7, 67.8, 67.9,

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1. *Introduction*
 2. *Background*
 3. *Methodology*
 4. *Results*
 5. *Discussion*
 6. *Conclusion*
 7. *References*
 8. *Appendix*
 9. *Index*
 10. *Table of Contents*
 11. *Abstract*
 12. *Keywords*
 13. *Summary*
 14. *Notes*
 15. *References*
 16. *Appendix*
 17. *Index*
 18. *Table of Contents*
 19. *Abstract*
 20. *Keywords*
 21. *Summary*
 22. *Notes*
 23. *References*
 24. *Appendix*
 25. *Index*
 26. *Table of Contents*
 27. *Abstract*
 28. *Keywords*
 29. *Summary*
 30. *Notes*
 31. *References*
 32. *Appendix*
 33. *Index*
 34. *Table of Contents*
 35. *Abstract*
 36. *Keywords*
 37. *Summary*
 38. *Notes*
 39. *References*
 40. *Appendix*
 41. *Index*
 42. *Table of Contents*
 43. *Abstract*
 44. *Keywords*
 45. *Summary*
 46. *Notes*
 47. *References*
 48. *Appendix*
 49. *Index*
 50. *Table of Contents*
 51. *Abstract*
 52. *Keywords*
 53. *Summary*
 54. *Notes*
 55. *References*
 56. *Appendix*
 57. *Index*
 58. *Table of Contents*
 59. *Abstract*
 60. *Keywords*
 61. *Summary*
 62. *Notes*
 63. *References*
 64. *Appendix*
 65. *Index*
 66. *Table of Contents*
 67. *Abstract*
 68. *Keywords*
 69. *Summary*
 70. *Notes*
 71. *References*
 72. *Appendix*
 73. *Index*
 74. *Table of Contents*
 75. *Abstract*
 76. *Keywords*
 77. *Summary*
 78. *Notes*
 79. *References*
 80. *Appendix*
 81. *Index*
 82. *Table of Contents*
 83. *Abstract*
 84. *Keywords*
 85. *Summary*
 86. *Notes*
 87. *References*
 88. *Appendix*
 89. *Index*
 90. *Table of Contents*
 91. *Abstract*
 92. *Keywords*
 93. *Summary*
 94. *Notes*
 95. *References*
 96. *Appendix*
 97. *Index*
 98. *Table of Contents*
 99. *Abstract*
 100. *Keywords*
 101. *Summary*
 102. *Notes*
 103. *References*
 104. *Appendix*
 105. *Index*
 106. *Table of Contents*
 107. *Abstract*
 108. *Keywords*
 109. *Summary*
 110. *Notes*
 111. *References*
 112. *Appendix*
 113. *Index*
 114. *Table of Contents*
 115. *Abstract*
 116. *Keywords*
 117. *Summary*
 118. *Notes*
 119. *References*
 120. *Appendix*
 121. *Index*
 122. *Table of Contents*
 123. *Abstract*
 124. *Keywords*
 125. *Summary*
 126. *Notes*
 127. *References*
 128. *Appendix*
 129. *Index*
 130. *Table of Contents*
 131. *Abstract*
 132. *Keywords*
 133. *Summary*
 134. *Notes*
 135. *References*
 136. *Appendix*
 137. *Index*
 138. *Table of Contents*
 139. *Abstract*
 140. *Keywords*
 141. *Summary*
 142. *Notes*
 143. *References*
 144. *Appendix*
 145. *Index*
 146. *Table of Contents*
 147. *Abstract*
 148. *Keywords*
 149. *Summary*
 150. *Notes*
 151. *References*
 152. *Appendix*
 153. *Index*
 154. *Table of Contents*
 155. *Abstract*
 156. *Keywords*
 157. *Summary*
 158. *Notes*
 159. *References*
 160. *Appendix*
 161. *Index*
 162. *Table of Contents*
 163. *Abstract*
 164. *Keywords*
 165. *Summary*
 166. *Notes*
 167. *References*
 168. *Appendix*
 169. *Index*
 170. *Table of Contents*
 171. *Abstract*
 172. *Keywords*
 173. *Summary*
 174. *Notes*
 175. *References*
 176. *Appendix*
 177. *Index*
 178. *Table of Contents*
 179. *Abstract*
 180. *Keywords*
 181. *Summary*
 182. *Notes*
 183. *References*
 184. *Appendix*
 185. *Index*
 186. *Table of Contents*
 187. *Abstract*
 188. *Keywords*
 189. *Summary*
 190. *Notes*
 191. *References*
 192. *Appendix*
 193. *Index*
 194. *Table of Contents*
 195. *Abstract*
 196. *Keywords*
 197. *Summary*
 198. *Notes*
 199. *References*
 200. *Appendix*
 201. *Index*
 202. *Table of Contents*
 203. *Abstract*
 204. *Keywords*
 205. *Summary*
 206. *Notes*
 207. *References*
 208. *Appendix*
 209. *Index*
 210. *Table of Contents*
 211. *Abstract*
 212. *Keywords*
 213. *Summary*
 214. *Notes*
 215. *References*
 216. *Appendix*
 217. *Index*
 218. *Table of Contents*
 219. *Abstract*
 220. *Keywords*
 221. *Summary*
 222. *Notes*
 223. *References*
 224. *Appendix*
 225. *Index*
 226. *Table of Contents*
 227. *Abstract*
 228. *Keywords*
 229. *Summary*
 230. *Notes*
 231. *References*
 232. *Appendix*
 233. *Index*
 234. *Table of Contents*
 235. *Abstract*
 236. *Keywords*
 237. *Summary*
 238. *Notes*
 239. *References*
 240. *Appendix*
 241. *Index*
 242. *Table of Contents*
 243. *Abstract*
 244. *Keywords*
 245. *Summary*
 246. *Notes*
 247. *References*
 248. *Appendix*
 249. *Index*
 250. *Table of Contents*
 251. *Abstract*
 252. *Keywords*
 253. *Summary*
 254. *Notes*
 255. *References*
 256. *Appendix*
 257. *Index*

COINCIDENCE METHOD FOR DISTRIBUTION SYSTEM

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COINCIDENCE METHOD FOR DISTRIBUTION SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to a method for coincidence
5 among common data which is distributed and held in a distribution
system having one or more elements including a computation
device to enter or withdraw into/from the system.

In a distribution system where plural data bases holding
master data and its partial sets as duplicate data are
10 distributed, as to duplicate-data-update, a data update control
method and apparatus for distribution data base system disclosed
in Japanese Unexamined Patent Publication No. H10-320356 is
known.

In this method, the master data base side holding the
15 master data holds an update history file, and upon master data
update, the master data base side updates the update history
file. Upon reception of reference request, the update history
file of the master data is referred to, and if the file has been
updated, the data of the master data base is obtained. By this
20 arrangement, the master data base and the duplicate data base
can be independently updated, and time necessary for the master
data base update can be reduced.

In the common-data coincidence method in the conventional
distribution system as described above in which master data
25 exists, a device which holds the master data and never withdraws

from the system must be provided, and such device usually is a redundant element. Otherwise, if the device holding the master data withdraws from the system, the system cannot function.

5 Further, there is a high probability that the system cannot function due to the above feature when the device holding the master data is broken. To avoid such inconvenience, plural devices must hold the master data. In this case, such devices may be redundant elements.

10 Further, an abnormality detection device of multiple processing system to detect valid data from the abovementioned multiplexed data performs detection based on the assumption that the number of devices which output valid data is large. Accordingly, in a system controlled by a human manager or the
15 like, a problem occurs when a large number of outputs are not always valid data. Further, in a case where the number of element devices is too large, as coincidence among all the data cannot be obtained without difficulty, problems occur in the above-described method.

20 SUMMARY OF THE INVENTION

The present invention has been made in consideration of the above situation to provide a method for managing distributed common data to manage data without distinction between master
25 data and duplicate data. It is an object of the present

invention to manage the common data distributed and held by devices in the system without redundancy of element by obtaining coincidence among the common data based on the number of devices holding common data of the same value. In the data management, a significance level indicating the validity of data is defined, and data coincidence is obtained by weighting data by using the significance level.

To attain the above object, the present invention provides a distribution system having plural elements including one or more computation devices, in which upon occurrence of entrance or withdrawal of the elements, common data is distributed and held without distinction between master data and duplicate data among these plural common data. Further, in the system, coincidence among these data is obtained based on majority rule.

In the majority rule, a significance level is defined for each common data, and the significance level is used as a weight in the majority rule for coincidence among the common data. The majority rule here means a rule to obtain data coincidence in correspondence with the number of devices having the same data value among the element devices. The significance level is defined based on the number of updates. Otherwise, the significance level is defined based on data update event. Otherwise, the significance level is defined based on data update time.

The common data coincidence by majority rule is obtained

in accordance with a request from the element.. Otherwise, the common data coincidence by majority rule is obtained in accordance with access to any common data. Otherwise, the common data coincidence by majority rule is obtained

5 periodically in accordance with previously established information defined in advance. Otherwise, the common data coincidence by majority rule is obtained at a preprogrammed time based on the previously established information. The established information may be changed by a user during the operation of the distribution system. Further, the coincidence processing is repeated.

As described above, as coincidence can be obtained among common data distributed and held without distinction between master data and duplicate data, redundant element is not
15 necessary even in a system having elements which entry or withdraw into/from the system. Further, the influence of breakage of master-data holding device on peripheral elements as in the conventional system can be reduced. Further, as the significance level defined for each data or device is used as
20 a weight in the majority rule, the validity of data obtained as a result of majority rule can be increased. Further, by repeating the data coincidence processing, more data coincidence can be obtained.

Other features and advantages of the present invention
25 will be apparent from the following description taken in

conjunction with the accompanying drawings, in which like reference characters designate the same name or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS.

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Fig. 1 is a perspective view showing an example where the present invention is applied to a sales price management system in a retail store or the like;

Fig. 2 illustrates an established information management table held in an IC tag attached to a product;

Fig. 3 is a table showing the contents of established information changing request to a product;

Fig. 4 is a flowchart showing processing in IC tag initial setting and setting change;

Fig. 5 is a flowchart showing coincidence processing on common data distributed and held in IC tags;

Fig. 6 is a table showing coincidence processing starting condition held in the IC tag; and

Fig. 7 is a block diagram showing a system construction for application of the present invention to an advertisement method.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will now be described in detail in accordance with the accompanying drawings.

(First Embodiment)

Fig. 1 is a perspective view showing a selling price management system in a retail store or the like, to which the information coincidence method for distribution system of the present invention is applied. Numeral 1 denotes a shelf-type showcase of products in the retail store. The showcase 1 has products 2 on display. The products 2 may be soft drink cans or perishable food products. Further, the products 2 have different selling prices in respective retail stores. Further, IC tags 3 are attached to these products. The IC tag 3 holds information as shown in Fig. 2. In Fig. 2, a product ID 11 is information indicating the type of product to which the tag is attached. A price 12 is information indicating the actual selling price of the product to which the IC tag 3 is attached. In the example of this figure, the price is 100 Yen.

Further, an effective term 13 indicates a term during which the setting of the price 12 is effective and the price 12 is used as an actual selling price. For example, the effective term 13 is utilized when the price is changed only during a predetermined period of a sale or the like. Further,

in this example, in the effective term 13, a start date is not set, and an end date is December 30, 1999. In this case, the price 12 is effective from the point where the effective term 13 was set.

5 Further, the effective term 13 can be set as an endless term. Otherwise, the effective term 13 may be set as a time sale period or the like. In such case, it may be arranged such that the time at which a customer has taken the product from the showcase 1 is stored into the IC tag 3, and it is determined
10 whether the price is a time sale price or not. Further, a standard price 14 indicates a normal time selling price after the expiration of the effective term 13. In Fig. 1, reference numeral 4 denotes a device which sets the established information as shown in Fig. 2 of the IC tag 3. An operator
15 5 who manages selling prices performs selling-price initial setting by the device 4. The setting is limitedly performed to uniformly change the price of related products, upon selling price initial setting, setting change or the like. Upon setting, the device 4 transmits information as shown in Fig. 3 to the
20 IC tag 3 attached to the product 2 by wireless communication.

Fig. 4 shows the flow of processing in the IC tag 3 which received the information from the device 4. At all times, the IC tag 3 waits for reception of established information changing request. First, at step ST1, an established information
25 changing request message is received from the device 4. The

received message, as shown in Fig. 3, has an item ID 21 indicating the type of product as a request transmission destination, a price 22 to be set, and an effective term 23 indicating a term during which the price 22 is effective as a selling price of the product 2. Next, the process proceeds to step ST2, at which it is determined whether or not the item ID 21 of the received established information changing request message is valid. For example, it is determined whether or not the item ID 11 held in the IC tag 3 corresponds with the item ID 21 of the received established information changing request message. It is determined as a result of determination at step ST2 that the item ID is valid, the process proceeds to step ST3, at which the price 12 and the effective term 13 held in the IC tag 3 are replaced with the price 22 and the effective term 23 of the established information changing request. At the completion of the processing, the IC tag again waits for the established information changing request. Further, if it is determined at step ST2 that the item ID is not valid, the process ends, and the IC tag waits for the reception of established information changing request.

Next, Fig. 5 shows the flow of processing of common data coincidence method in the distribution system of the present invention. First, at step ST11, it is determined whether or not established time has come, otherwise, it is determined whether or not time of established cycle has elapsed since the

execution of previous information coincidence processing. It may be arranged such that the IC tag 3 holds information such as starting time 31 and last starting time 32 indicating the time of previous information coincidence processing, and an established cycle 33, used at step ST1, in the form of table as shown in Fig. 6. The starting time 31 may be plural times. Further, the starting time 31 and the established cycle 33 may not be set.

If it is determined at step ST11 that the starting time has not come or time of the established cycle has not elapsed, the process proceeds to step ST12. At step ST12, it is determined whether or not a previously-defined event as a starting trigger of the coincidence processing has occurred. The event is e.g. entry/withdrawal of element or access to the common data. In this embodiment, the event can be purchase of the product 2 by a customer, replenishment of the products 2 which are running short, or checking of the price 12 held in the IC tag 3. If it is determined at step ST12 that the event has not occurred, the process proceeds to step ST13. At step ST13, it is determined whether or not a coincidence request has been received from another element. If it is determined that no coincidence request has been received from another element, after a predetermined waiting period, the process returns to step ST11. If it is determined at step ST11 that the set starting time has come or time of the established cycle has elapsed, the

process proceeds to step ST14.

Further, if it is determined at step ST12 that the event has occurred, the process proceeds to step ST14. Further, if it is determined at step ST13 that a coincidence request has been received from another element, the process proceeds to step ST16. At this time, a correction message for an internal clock held in the IC tag 3 is also received, and based on the message, the internal clock of the IC tag 3 is corrected. When the correction message is received, coincidence processing on the common data of the set time and the set cycle by the time indicated by the correction message is cancelled. At step ST14, the elements are acquired. The acquisition of the elements can be made by using a survival signal which each element periodically transmits. The elements in this embodiment are all the products 2 (IC tags 3) in the same showcase 1.

Next, the process proceeds to step ST15, at which a coincide request message is transmitted to these elements. At this time, a correction message to the internal clock of the IC tag 3 of each element is attached to the coincidence request message, then the coincidence message is transmitted. At step ST16, as to the common data to which the coincidence request has been made, the data held in the IC tag 3 is transmitted. The common data here is, e.g., the price 12 and the effective term 13 held in the IC tag 3. Further, at step ST17, the common data transmitted at step ST16 is received. It may be arranged

such that the acquisition of the message is made for a predetermined period, and then the process proceeds to step ST18. Otherwise, it may be arranged such that, based on the number of elements obtained at step ST14, the process proceeds to step ST18 if a predetermined numbers of messages are obtained.

At step ST18, it is determined whether or not the common data must be updated. In this determination, only the messages obtained at step ST17 are used. Among the messages obtained at step ST17, the data value owned by the largest number of messages is used as common data value. Regarding respective data, a significance level is set for each device or each data in the IC tag 3, and the significance level is utilized as a weight in the above determination. The determination by significance level is made since the number of common data is unfixed, and determination cannot be performed simply by majority rule when the products have high data reliability though the number of the products is small from the start. Accordingly, in such case, the significance level may be increased in proportion to the number of data updates. Otherwise, the significance level may be increased upon data update by the device 4. Otherwise, the significance level may be increased upon direct data setting by a user. Otherwise, in accordance with data update time, the significance level of late update data may be increased. If it is determined as a result of determination that the common data must be updated,

the process proceeds to step ST19, to update the common data.

If all the obtained data do not correspond with each other, it may be determined that the coincidence processing has not been performed on all the data, and coincidence request may be made again. Then, after a predetermined waiting period, the process returns to step ST11. Further, if it is determined at step ST18 that the common data is not to be updated, the process returns to step ST11 after a predetermined waiting period. Thus the coincidence processing enables data input without setting different selling prices for respective retail stores upon arrival of products.

Note that the present invention is also applicable to a product advertisement method by using a system as shown in Fig.

7. When coincidence is obtained among the selling prices, the advertisement information including the coincidence-processed selling price may be transmitted from a store processing apparatus via a network such as the Internet to customer processing apparatuses. Further, the information may be transmitted from the product to the customers without the store processing apparatus. Further, communication with the customers is not limited to the transmission to the customer processing apparatuses, but may be made via facsimile or telephone transmission. Further, the advertisement may be displayed on a display device in a store or the like instead of being transmitted to the customers.

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